

## "A Decade in Leaps and Bounds": Pharmacy in Jordan- revisited

Mohammad IE Abu Asab<sup>1</sup>, Leen Abushams<sup>2</sup>, Abla Albsoul-Younes<sup>2</sup>, Mayyada Wazaify<sup>2\*</sup>

<sup>1</sup> Department of Clinical Pharmacy, Faculty of Pharmacy Zarqa University, Zarqa, Jordan.

<sup>2</sup> Department of Clinical Pharmacy and Biopharmaceutics, School of Pharmacy, The University of Jordan.

### ABSTRACT

This paper comes after 10 years of the previous "Pharmacy in Jordan" review that was published in American Journal of Health System Pharmacy in 2005. The aim of this new article is to highlight the most important achievements that have been made in different sectors of Pharmacy in the Hashemite Kingdom of Jordan. This leap involved pharmaceutical industry, education, clinical pharmacy practice, technology and pharmacy others. Technology is now used on a wider scale in governmental health sectors and HAKEEM program is a living example. Many pharmacies currently specially chain pharmacies, utilize various forms of pharmacy management systems with bar-code reading to control point of sales (PoS), inventory and customer relationships. Most chain pharmacies now also keep electronic patient medication records or use software to keep patient prescription data and check drug interactions. Furthermore, chain pharmacies have expanded from just one in 2001 to a total of 56 chains in 2017, with the first drive-through pharmacy in Jordan launched in the same year. The role of the pharmacist in Jordan has shifted gradually, with approximately 24 hospitals out of 106 total hospitals in the country having some established form of clinical pharmacy services.

**Keywords:** Clinical, Education, Jordan, Pharmacy, Review.

### 1. INTRODUCTION

Following up from a previously published "Pharmacy in Jordan" paper in 2005<sup>(1)</sup>, the last decade was full of achievements for Jordan on the pharmacy practice, education and research levels. Modern Jordan, officially The Hashemite Kingdom of Jordan is a developing country with 10,248,069 residents<sup>(2)</sup>. According to the World Bank, Jordan is considered the best healthcare service provider in the Middle East<sup>(3)</sup>. The Ministry of Health operates 27 hospitals and 1,245 primary care clinics<sup>(3)</sup>. The private sector operates 56 hospitals, and the Royal Medical Service operates 11 hospitals<sup>(3)</sup>. In 2007 Jordan Hospital, the largest private hospital was the first general specialty hospital to receive JCAHO international accreditation<sup>(3)</sup>. King Hussein Cancer Center is the only specialized cancer

treatment center in the Middle East and one of the top cancer treatment facilities in the world<sup>(3)</sup>. The World Bank ranks Jordan as a top medical tourism destination in the Middle East and North Africa<sup>(3)</sup>. In 2016, Jordan was ranked as number 33 in the Medical tourism globally and first in the Region<sup>(3)</sup>. This classification confers with the availability of high caliber of health services (e.g. well-equipped hospitals, specialized doctors, advanced medical equipments, well trained health providers, availability of original and good quality of medicines<sup>(3)</sup>). All medications have to undergo regulatory registration, testing, pricing and market release by the official regulatory body; Jordan Food & Drug Administration<sup>(4)</sup>. Jordan is considered as a hub in the region for pharmacy education with 19 colleges of pharmacy and a growing pool of students in different levels and degrees of pharmaceutical education. This decade was full of achievements and here comes this article to highlight the most important updates.

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\* m.wazaify@ju.edu.jo.

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### **Pharmaceutical Industry**

Jordan is a regional market leader in the Pharmaceutical Industry, manufacturing branded generics and exporting to over 60 countries around the world<sup>5</sup>. Jordan Local Pharmaceutical Industry has been present since 1960, accounting currently to 23 manufacturing companies, having a size of two billions USD as investment with a total market (local & export) at export price in US Dollars of 883 million while the share of the export share was 750 million USD as recorded by the Central Bank of Jordan<sup>(6,7)</sup>.

Leading manufacturers own plants around the world and are venturing into Biotechnology where traditionally they manufacture antibiotics, hormones, chemotherapy and others. For example, Hikma Pharmaceuticals PLC: 29 manufacturing plants in 11 countries and supplying over 50 countries<sup>(8)</sup>.

### **Jordan Royal Medical Services (JRMS)**

In 1948, the pharmaceutical sector established its services at the Jordan Royal Medical Services' at the Arabic Army when the first pharmacy rose in the Main hospital (known as Marka hospital)<sup>(9)</sup>.

In 1952, the first official pharmacist joined the JRMS, Nowadays it has the lion share with number of pharmacists employed with the enumeration of 286 pharmacists in 2016 (Ministry of Health, 2018). JRMS is working hard to improve this sector via the following development and training programs : 1- Technical classification system for pharmacists, 2- Residency programs (Clinical pharmacy and management and supply pharmacy), where pharmacists are requested to carry on a 4-year residency in a clinical or management specialty 3- Specialized courses (Masters in clinical pharmacy , management and supply pharmacy and Quality Management) that are funded by the JRMS 4- Comprehensive Examination (Board of pharmacy) which comes after the residency years and

finally 5- Sponsoring pharmacists to attending and participate in International conferences and workshops outsourcing<sup>(9)</sup>. In the past 20 years, JRMS hosted 8 international conferences, the 9<sup>th</sup> of which is planned in October 2018<sup>(9)</sup>.

### **Clinical Pharmacy Sector:**

Just like the rest of the world, the role of the pharmacist in Jordan has shifted gradually in the past 20 years from the classical role of dispensing to a more patient-oriented role. With the broadening of the clinical pharmacy specialty, more awareness of the concept of Pharmaceutical Care has been noticed<sup>(10)</sup>. The first specialized clinical pharmacy services in Jordan started at the King Hussein Cancer Center in 2005, with clinical pharmacists attending clinical rounds and offering patient counselling and documenting interventions<sup>(11)</sup>.

Clinical pharmacy services in Jordan has leaped big steps in the past 10 years with approximately 24 hospitals out of 106 total hospitals in the country<sup>11</sup> having some established form of clinical pharmacy services. (Personal contact- Department of Clinical Pharmacy, Ministry of Health, 2017) This includes JRMS, King Hussein Cancer Centre (KHCC), the university hospitals, some Ministry of Health hospitals, and some leading private hospitals in the country<sup>(11)</sup>.

There are currently 2 different forms of clinical pharmacy services in Jordanian hospitals: 1- A specialized department to provide clinical pharmacy services (All department members are PharmD or Msc. of clinical pharmacy graduates), 2- Not a specific clinical pharmacy unit; only the head of Clinical Pharmacy department is a PharmD or Msc. clinical pharmacist graduate but staff varies, or unit provides clinical pharmacy activities on an individual basis. Those hospitals are summarized in Table (1).

**Table (1)**  
**Different hospitals providing clinical pharmacy services in Jordan (N=124)**

Type of Clinical Pharmacy Practice	1- A specialized clinical pharmacy department	2- Not a specific clinical pharmacy unit
Names of Hospitals	<ul style="list-style-type: none"> <li>• Jordan University hospital,</li> <li>• Jameel Al-TotANJI hospital,</li> <li>• King Hussien Cancer Centre (KHCC),</li> <li>• Jordan Royal Medical Services (Medical City),</li> <li>• Al-Khalidi hospital,</li> <li>• Al-Israa Hospital,</li> <li>• Arab Heart Centre,</li> <li>• Ibn Al-Haytham hospital,</li> <li>• Al-Yarmouk Hospital,</li> <li>• King Abdullah University Hospital,</li> <li>• Princess Basma Hospital,</li> <li>• Al-Mafraq Hospital.</li> </ul>	<ul style="list-style-type: none"> <li>• Specialty hospital,</li> <li>• Jordan Hospital,</li> <li>• Princess Raya Hospital,</li> <li>• Princess Rahmah Hospital,</li> <li>• Al-Karak Hospital,</li> <li>• Ma`an Hospital,</li> <li>• Al-Ayman Hospital,</li> <li>• Al-Hussien Hospital in Al-Salt,</li> <li>• Al-Nadeem Hospital, Princess</li> <li>• Prince Faisal Hospital.</li> </ul>

**Pharmacy and Technology:**

According to medication and Pharmacy Law, pharmacies in Jordan are classified into two categories: the first one is general pharmacies that comprise all types of community pharmacies (individual and chain) as they serve the public in general<sup>(4)</sup>. The second is the specialized pharmacies that are designed to serve specific types of patients. This include all governmental sector pharmacies, private hospitals pharmacies, and pharmacies that are parts of medical services provided by specific institutes and organizations such as registered charities (who distribute medications for free to beneficiaries)<sup>(4)</sup>.

As for the field of technology, many pharmacies specially chain pharmacies, utilize various forms of pharmacy management systems with bar-code reading to control point of sales (PoS), inventory and customer relationships (personal contact, Jordan Food and Drug administration, 2017). Many community pharmacies now also keep electronic patient medication records or use software to keep patient prescription data and check drug interactions<sup>(12)</sup>. Furthermore, technology is now used in

governmental health sectors such as health insurance and JFDA in the field of registering medications<sup>(13)</sup>. HAKEEM program is a living example of computerizing the public health sector which was applied as a pilot start in 2009 at some governmental hospitals (e.g Prince Hamzah hospital) to document and follow all medication dispensing history of patients so as to prevent duplication in dispensing medication through nationwide implementation of an electronic health record<sup>(14,15)</sup>.

**Community and Hospital Pharmacy Practice**

There are 20803 registered pharmacists in Jordan, among which 14135 are residents in Jordan, 3212 are residents outside Jordan, 648 are retired, and 438 are dead<sup>16</sup>. The majority of pharmacists in Jordan (n=12835 ; 90.8% .3%) work in the private sector (ie- community pharmacies owners (n=3214) with around 5000 employed pharmacists, drug stores owners (n= 324), Jordanian Pharmaceutical manufacturing and Research companies (n=28), private hospitals (n= around 200) and insurance companies)<sup>(16)</sup>. The rest (n= around 1300) work in

government sector or pharmacies of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA; n=2)<sup>(16)</sup>. Government sector pharmacies consist (in a decreasing order) of hospital and clinic pharmacies (n=484, 2013 est.), university hospitals pharmacies (The Jordan University Hospital (JUH; n=31); and King Abdullah-I University Hospital (KAUH;n= 27) and those of the Royal Medical Services (JRMS; n=243; 2013 est). The main duties of the pharmacists in Jordan involve dispensing and promoting the rational use of drugs. However, there has been a trend in newly established community pharmacies to accommodate a special area to provide clinical pharmacy services, patient counselling and answer drug-related queries<sup>(12)</sup>.

Community pharmacies are the most accessible primary health care facilities in Jordan with approximately ٣٧١٤ registered pharmacies distributed all over the relatively small country<sup>(22)</sup>. Pharmacists also work in drug stores (n=٣٧٤; 2017 est), pharmaceutical factories (n=18; 2017 est) or contract research organizations (CROs; n=7). In pharmaceutical Industry, pharmacists can work in Research and Development (R and D), Quality Control and Analysis.

Hospital pharmacies are broadly divided into inpatient and outpatient pharmacies. The duties of hospital pharmacists mainly pertain to administrative roles, such as drug orders, stock control, and personnel management, leaving dispensing activities largely for pharmacy technicians<sup>(17)</sup>. However, as described above, the number of clinical pharmacists has increased in the past 10 years and so as the number of hospitals providing such services. This is in part due to the increased number of PharmD and Msc. Clinical Pharmacy graduates in Jordan in the past decade, as well as increased competition among private hospitals and trying to build a reputation of being up to date among patients.

With regard to clinical pharmacists and Pharm.D graduates; their main duties are to work hand in hand with physicians in order to ensure that each patient obtains the

most suitable medications that meet his needs in terms of indication, effectiveness and safety. Moreover, clinical pharmacists coordinate other pharmacists and pharmacy assistants' duties and assure the application of the Ministry of Health's laws in terms of medication registration and handling<sup>(17)</sup>.

The main positions of the pharmacist in CROs are: Regulatory, Biometrics and Medical Affairs manager; pharmacokinetics, clinical site manager, study director, analysts, and regulatory affairs officer. (Reference: Appendix 4: Job description).

### Chain Pharmacies

In 2001, Pharmacy one, the first chain pharmacy was opened<sup>1</sup>. This pharmacy was the first to offer home delivery services, which appeared to be performed against the Drug and Pharmacy law (JFDA Laws and Regulations) and was subsequently banned by the JFDA in order to enforce patient counseling concept and monitoring of the OTC drugs consumption; Now pharmacy one has opened a total of 67 branches with 50 in Amman only<sup>(18)</sup>. In 2017, Pharmacy one launched the first drive-through pharmacy in Jordan which was also subject to controversy among pharmaceutical sector<sup>(19)</sup>.

At the time of writing this review, there has been a total of 56 chain pharmacies do exist in different areas of Jordan such as Drug Center, Dawakom, Orange (Aster), Rawhi, Pharmacy A... etc . (2).

### Health Insurance:

In terms of health insurance, 87% of Jordanians are covered by different insurance sectors (private companies covers 20% and governmental sectors covers the 67%)<sup>(7)</sup>.

According to the Health Insurance Directorate, the insurances policy include contracting with different hospitals (governmental and private) in different but suitable policies in a total of 45 hospitals. In addition, the national health insurance is free for all children under 6 years old and includes a reduced fee for pregnant ladies

(up to 42 days after delivery) and those above 60 years<sup>(20)</sup> while the rest of the population benefits by paying only 5% of the total cost of medicine as it's price to be not lower than quarter Jordanian Dinar<sup>(20)</sup>.

### **The Regulation of Pharmacy Profession**

The Pharmacy profession in Jordan is regulated and governed by three separate yet integrative official bodies namely 1. Health Professions and Institutions Licensing Directorate (HPILD) responsible for accreditation and licensing. 2. Jordan Food and Drug Administration (JFDA): responsible for registering, pricing, and market releasing of medicines as well as inspecting the pharmaceutical institutions and 3. Jordanian Pharmacists association (JPA): the only body representing the interests of all pharmacists in all professional sectors. In 2010, JPA adopted the Good Pharmacy Practice (GPP) approach as detailed below.

### **Good Pharmaceutical Practice (GPP) Committee:**

In April 2010, the White Blog of Good Pharmaceutical Practice (GPP) was launched throughout the 13<sup>th</sup> Jordanian Pharmaceutical Conference. It was adopted from the International Pharmaceutical Federation (FIP), which first adopted the guidelines for GPP in 1993. GPP is defined as the practice of pharmacy that responds to the needs of the people who use the pharmacists' services to provide optimal, evidence-based care<sup>12</sup>. This concept was adopted from the pharmaceutical care concept by Hepler and Strand, which is the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that improve a patient's quality of life<sup>(21)</sup>.

### **Jordan Food and Drug Administration (JFDA):**

JFDA was established in 2003 as the only national reference that guarantee food safety, quality and goodness for human consumption at all stages<sup>(13)</sup>. Furthermore, it guarantee safety of drug as well as its effectiveness and

potency in treating diseases by achieving a number of national targets such as : 1- Make sure that Jordanians have a decent standard of health on various levels 2- Develop the Jordanian economy to become prosperous and open to regional and global markets, In addition to strategic ones like: 1- Development of institutional performance in accordance with the global standards and bases 2- Strengthen the role of the institution as a reference in control 3- Contributing to the achievement of food and drug security 4- Optimal use of available sources<sup>(13)</sup>.

With regard to medication barcoding, and looking back to the old short-term goals, the JFDA was concerned with achieving a bar-code system that was applied by numerous pharmacies with the use of 13 digits<sup>(23)</sup>. Currently, the JFDA has a new mission to apply a new system called "DATA MATRIX" in 2018, which includes: bar-code system of 14 digits, patch number, expiry date and serial number, so it will be much more totalitarian than the bar-code system<sup>(24)</sup>. Secondly, Drug-drug interaction concept is represented in a new unit at JFDA called: Pharmacovigilance Unit<sup>(13)</sup>. Pharmacovigilance is known as the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug-related problem<sup>(25)</sup>. The Pharmacovigilance Unit was established in 2001 within drug directorate/Ministry of Health (MOH) and became a member of WHO program for international drug monitoring in 2002 and in 2006 the first guidelines were agreed on based on the International Council for Harmonization (ICH) Guidelines<sup>(25)</sup>. The reporting system is voluntary and conducted using the yellow cards to report Adverse Drug Reaction (ADR) to JPC<sup>(26)</sup>. First office of Pharmacovigilance was established in 2012 at Al-Karak teaching hospital in addition to other 4 located in the north, middle and south: Al-Bashir hospital, Prince Hamza hospital, King Abdalla-I University Hospital, and The University of Jordan Hospital<sup>(26,27)</sup>.

The University of Jordan Pharmacovigilance center was established in March 2015 and is hosted by the School

of Pharmacy at The University of Jordan as a part of the National Pharmacovigilance Centre (NPC). This center is meant to achieve the following targets through short term (6 months) and long term (1-2 years) plans<sup>(27)</sup>:

- Communicate drug safety updates and latest information to healthcare professionals within UJ.
- Strengthen the culture and practice of ADR reporting.
- Create awareness of ADR monitoring & reporting.
- Improve both the quality and quantity of ADRs reporting to ensure better identification and investigation of side effects.
- Promote rational, effective, and safe use of drugs.
- Develop the first national Pharmacovigilance network.

As for the withdrawal of defected drug from the market, it is achieved by a specific system that includes informing the representative of the drug then by its turn informs the JPA, pharmacies, Jordanian Medical Association (JMA) and any facility concerned by this decision then the withdrawal procedure begins.

#### **Pharmaceutical Research:**

Pharmaceutical research now took a path of interest specially that Jordan continued to be a Centre of Excellence for clinical trials even though drug trials are much lower than the ones in Europe or The US<sup>28</sup>. In addition it is a host of 7 Contract Research Organizations (CROs) with EMEA FDA accreditations: Acdimia, Triumpharma, Jordan Center for Pharmaceutical Research (JCPR), International Pharmaceutical Research Center (IPRC), Pharmaceutical Research Unit (PRU), King Abdullah University Hospital / Irbid and finally Pharma Quest Jordan.

The approximate number of studies submitted between 2005 and 2013 was 1,470 clinical studies (for registered and unregistered products) with an emphasis on

bioequivalence and bioavailability studies (around 87.4% of total studies)<sup>(28)</sup>.

#### **Pharmacy Education:**

In the past decade, schools of pharmacy in Jordan has jumped from only 8 total (2 public and 6 private schools) to become 19 schools in total (5 public and 14 private schools, Table (2)). The number of students and graduates increased specially after the establishment of Pharm D section in 2000 at Jordan University of Science and Technology (JUST) and 2005 at University of Jordan (UJ)<sup>(29)</sup>. The average number of entry in the schools of pharmacy was 2738 in the year 2015-2016 according to the annual report of the Ministry of Higher Education<sup>(30)</sup>. The total number of undergraduate pharmacy students in Jordan in 2015-2016 was 13643 (9264 of which were female)<sup>(30)</sup>. The number of graduates also has doubled from 748 in 2002-2003 up to 1975 in 2015-2016 (1417 of which were female)<sup>(30)</sup>.

The competition became epic between universities, major of which is sending qualified students abroad in scholarships to come back as staff members. In 201<sup>9</sup>-201<sup>7</sup>, the number of Jordanian students on scholarships abroad for PhD degree in Medicine, Dentistry and Pharmacy was estimated to be 38<sup>(31)</sup>.

Regarding the education system in the faculties of pharmacy, it has a five-year bachelor program which requires the completion of 150-162 credit hours in dedication instruction and 1440 hours of training at community pharmacies, hospitals or industry<sup>(1)</sup>. As for Pharm D degree in University of Jordan with the fact of entering a six-year program with credit hour of 216 didactic instruction including 29 weeks training<sup>(32)</sup>. The post graduates masters in UJ is either in clinical pharmacy or pharmaceutical sciences with a 33-hour credit or a thesis to be specialized in either one of 2 disciplines<sup>(33,34)</sup>. Furthermore, the University of Jordan has launched a PhD program in pharmaceutical sciences with 54 credit hours of different pharmaceutical courses, a qualifying exam and

a thesis to get the degree as a PhD qualified pharmacist<sup>(35)</sup>.

**Table (2)**

**Summary of schools of pharmacy in Jordan and comparison between years 2005 and 2017 (n=19)**

	<b>University Name</b>	<b>2005</b>	<b>2017</b>
1	The University of Jordan	✓	✓
9	Al - Ahliyya Amman University	✓	✓
12	Al - Isra University	✓	✓
14	Al-Zaytoonah Private Uni	✓	✓
19	American University of Madaba	✗	✓
6	Amman Arab University	✗	✓
10	Applied Science Private University	✓	✓
16	Aqaba University of Technology	✗	✓
17	Irbid Private University	✗	✓
8	Jadara University	✗	✓
18	Jerash University	✗	✓
4	Jordan University of Science & Technology	✓	✓
7	Middle East University	✗	✓
3	Mu'tah University	✗	✓
13	Petra Private University	✓	✓
11	Philadelphia Private University	✓	✓
5	The Hashemite University	✗	✓
2	Yarmouk University	✗	✓
15	Zarqa University	✗	✓

Pharmacy huge shift from 10 years till now included the construction of the virtual pharmacy lab in October 2017 at The University of Jordan and other universities in order to gain the national accreditation<sup>(36)</sup>. The School of Pharmacy at the University of Jordan was the first in Jordan and in the region to get certified by the Accreditation Council for Pharmacy education (ACPE) on the 29<sup>th</sup> of June 2016<sup>(37)</sup>. Other schools of pharmacy in Jordan are currently in the process of getting the international accreditation.

### **Limitations**

Every effort has been made during the preparation of this review, to obtain the most accurate and updated information from reliable updated and accredited sources.

The fact that some data was obtained through personal communication may have affected the robustness of this review.

### **Conclusion**

Jordan is a developing country which is full of potentials and brains that carried country's different sectors to new upper levels as had been noticed. The past 10 years formed a huge leap for pharmacy sector on all levels. A future plan is the emerge of a Higher Board in pharmacy under the umbrella of the Higher Medical board, to provide specialized pharmacists in various sectors such as oncology, pediatric, diabetic care, smoking cessation and more which means that at the moment we can at least that

this small country will keep up the development in every possible way.

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## الصيدلة في الأردن في العقد الأخير: مزيد من الإنجازات والقفزات

محمد ابو عصب<sup>1</sup>، لين ابو شمس<sup>2</sup>، عبلة البصول يونس<sup>2</sup>، ميادة وظيفي<sup>2</sup>

<sup>1</sup> كلية الصيدلة، جامعة الزرقاء.

<sup>2</sup> كلية الصيدلة، الجامعة الاردنية.

### ملخص

تأتي هذه الورقة العلمية بعد ١٠ سنوات من سابقتها "Pharmacy in Jordan" لتسلط الضوء على أهم الإنجازات التي تمت في مختلف قطاعات الصيدلة في الأردن كالصناعة الدوائية والصيدلة السريرية والتعليم الصيدلاني، بالإضافة لقطاع التكنولوجيا واستخداماتها المختلفة في الصيدلة. من أبرز الأمثلة المطروحة في هذا المقال هو الاستخدام المتزايد للتكنولوجيا في القطاعات المختلفة مثل استخدام PoS في صيدليات المجتمع وتوظيف برنامج "حكيم" في بعض المستشفيات الحكومية. كما ازداد عدد السلاسل الصيدلانية من واحدة فقط في عام ٢٠٠١ الى ٥٦ في عام ٢٠١٧ وتم افتتاح أول فرع صيدلية يقدم خدمة السيارات في نفس العام. وفي سياق الصيدلة السريرية، بلغ عدد المستشفيات التي تقدم خدمة الصيدلة السريرية لمرضاها في عام ٢٠١٧ (٢٤) مستشفى من أصل ١٠٦ مستشفى في كامل المملكة.

**الكلمات الدالة:** السريري، التعليم، الأردن، الصيدلة.